

LEVEL

SUSQUEHANNA RIVER BASIN
MILLER'S RUN, BRADFORD COUNTY
PENNSYLVANIA

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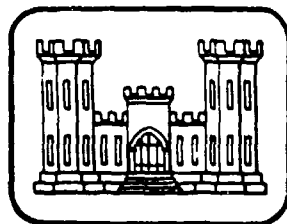
AD A108963

MILLER'S POND DAM

NDI No. PA 01004
PennDER No. 8-27
Dam Owner: Ernest Weaver

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
PARW 31-81-C-0011



prepared for

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

prepared by

MICHAEL BAKER, JR., INC.
Consulting Engineers
4301 Dutch Ridge Road
Beaver, Pennsylvania 15009

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plates. All DTIC reproductions
will be in black and
white.**

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June 1981

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Phase I Inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

Miller's Pond Dam, Bradford County, Pennsylvania
NDI No. PA 01004, PennDER No. 8-27
Miller Run
Inspected 31 March 1981

2
ASSESSMENT OF
GENERAL CONDITIONS

Miller's Pond Dam is owned by Ernest Weaver and is classified as a "Low" hazard - "Small" size dam. The dam was found to be in poor overall condition at the time of inspection.

Hydraulic/hydrologic evaluations, performed in accordance with procedures established by the Baltimore District, Corps of Engineers, for Phase I Inspection Reports, revealed that the spillway will pass the 100-year flood without overtopping the dam. A spillway design flood (SDF) in the range of the 50-year flood to the 100-year flood is required for Miller's Pond Dam. The 100-year flood was chosen as the SDF. Therefore, the spillway is considered "Adequate."

There are two seeps, approximately 5 g.p.m. and 1 g.p.m., and a minor boil near the downstream toe of the dam. There are depressions along the upstream crest which may indicate "piping" of the embankment materials. These areas should be monitored.)

> Several items of remedial work should be immediately initiated by the owner. These include:)

- > (1) Monitor the two areas of seepage at regular intervals and during periods of high reservoir levels for turbidity and/or increase in flow, which may indicate the potential for piping of embankment material. If turbidity or increased flows are noted, a qualified geotechnical engineering firm should be retained to recommend remedial measures.
- > (2) Fill, compact, and seed the depressions on the crest of the dam.)
- > (3) Cut all trees and brush on the embankment at ground level. All trees with a trunk diameter greater than 3 inches should have their root systems removed. All resultant areas of erosion and cavities should be filled, graded, compacted, and seeded.

next page

MILLER'S POND DAM

cont
→

- (4) Clear the spillway approach channel of all debris and protect with riprap.
- (5) Repair the discharge apron and training walls.
- (6) Fill and seed the areas of erosion behind the wingwalls.
- (7) Protect the channel immediately downstream from the embankment with erosion protection.
- (8) Provide means to draw down the reservoir during an emergency.

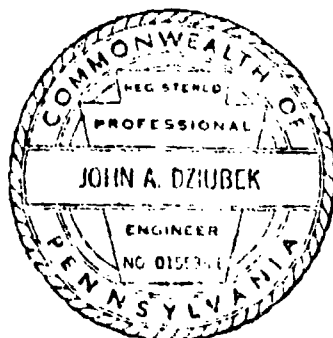
In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning plan.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) Activate the emergency operation and warning system when warning of a storm of major proportions is given by the National Weather Service.

It is further recommended that formal inspection, maintenance, and operational procedures and records be developed and implemented. These should be included in a formal maintenance and operations manual for the dam.

Submitted by:

MICHAEL BAKER, JR., INC.



John A. Dziubek
John A. Dziubek, P.E.
Engineering Manager-Geotechnical

Date: 26 June 1981

Approved by:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS

James W. Peck
JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

Date: 234481

MILLER'S POND DAM



Overall View of Upstream Side of Embankment and Spillway



Overall View of Downstream Side of Embankment and Spillway

TABLE OF CONTENTS

	<u>Page</u>
Section 1 - Project Information	1
Section 2 - Engineering Data	4
Section 3 - Visual Inspection	6
Section 4 - Operational Procedures	7
Section 5 - Hydraulic/Hydrologic	8
Section 6 - Structural Stability	9
Section 7 - Assessment, Recommendations/Remedial Measures	10

APPENDICES

Appendix A - Visual Inspection Check List, Field Sketch, Top of Dam Profile, and Typical Cross-Section
Appendix B - Engineering Data Check List
Appendix C - Photograph Location Plan and Photographs
Appendix D - Hydrologic and Hydraulic Computations
Appendix E - Plates
Appendix F - Regional Geology

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
MILLER'S POND DAM
NDI No. PA 01004, PennDER No. 8-27

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

- a. Authority - The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.
- b. Purpose of Inspection - The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 DESCRIPTION OF PROJECT

- a. Description of Dam and Appurtenances - Miller's Pond Dam is an earthfill embankment 230 feet long and 21.7 feet high. The embankment has a crest width varying from 40 feet to 51 feet, and side slopes of 1.8H:1V (Horizontal to Vertical) upstream and 1.4H:1V downstream. A township road runs along the crest of the dam.

The spillway, located near the center of the dam, is a concrete box culvert with an opening 20 feet wide and 6.3 feet high.

The dam has no outlet works for dewatering the reservoir.

- b. Location - Miller's Pond Dam is on Miller Run in Ridgebury Township, Bradford County, Pennsylvania. The dam is approximately 2.08 miles south of Bentley Creek in Ridgebury Township. The coordinates of the dam are N 41° 54.9' and W 76° 43.0'. The dam can be found on the USGS 7.5 minute topographic quadrangle, Bentley Creek, Pennsylvania.
- c. Size Classification - The height of the dam is 21.7 feet. Storage at the top of the dam [Elevation 1425.5 feet Mean Sea Level (ft. M.S.L.)] is 684 acre-feet. The dam is therefore in the "Small" size category.

- d. Hazard Classification - If the dam should fail, economic damage is likely to result to the township road on the crest of the dam. Loss of life is considered unlikely; therefore, the dam is considered to be in the "Low" hazard category.
- e. Ownership - The dam is owned by Ernest Weaver, RD #3, Columbia Crossroads, Pennsylvania 16914.
- f. Purpose of Dam - The impoundment created by the dam is used for recreation and fishing.
- g. Design and Construction History - The original designer and contractor for Miller's Pond Dam are unknown. Additional historical data is included in Section 2.
- h. Normal Operational Procedures - The reservoir is typically maintained at the spillway crest, Elevation 1416.0 ft. M.S.L.

1.3 PERTINENT DATA

- a. Drainage Area (square miles) - 2.66
- b. Discharge at Dam Site (c.f.s.) -

Maximum Flood -	Unknown
Spillway Capacity (El. 1422.3 ft. M.S.L. ¹) -	3655.0
- c. Elevation* (feet above Mean Sea Level [ft. M.S.L.]) -

Design Top of Dam -	Unknown
Minimum Top of Dam -	1425.5
Maximum Design Pool -	Unknown
Spillway Crest -	1416.0
Streambed at Toe of Dam -	1403.8
Maximum Tailwater of Record -	Unknown
- d. Reservoir (feet) -

Length of Maximum Pool (El. 1425.5 ft. M.S.L.) -	4100.0
Length of Normal Pool (El. 1416.0 ft. M.S.L.) -	3050.0

*All elevations are referenced to the spillway crest, Elevation 1416.0 feet M.S.L., as estimated from the USGS 7.5 minute topographic quadrangle, Bentley Creek, Pennsylvania.

¹Top of culvert opening.

- e. Storage (acre-feet) -
- | | |
|---------------------------------------|-------|
| Top of Dam (El. 1425.5 ft. M.S.L.) - | 634.0 |
| Normal Pool (El. 1416.0 ft. M.S.L.) - | 230.0 |
- f. Reservoir Surface (acres) -
- | | |
|---------------------------------------|------|
| Top of Dam (El. 1425.5 ft. M.S.L.) - | 51.0 |
| Normal Pool (El. 1416.0 ft. M.S.L.) - | 35.8 |
- g. Dam -
- | | |
|--|-----------|
| Type - | Earthfill |
| Total Length Including Spillway (feet) | 230.0 |
| Height (feet) - Design - | Unknown |
| Field - | 21.7 |
| Top Width (feet) - | 40.0-51.0 |
| Side Slopes - Upstream - | 1.8H:1V |
| Downstream - | 1.4H:1V |
| Zoning - | Unknown |
| Impervious Core - | Unknown |
| Cutoff - | Unknown |
| Drains - | None |
- h. Diversion and Regulating Tunnel -
- | | |
|--|------|
| | None |
|--|------|
- i. Spillway -
- | | |
|---------------------------------------|--------|
| Type - Concrete box culvert | |
| Location - Center of the dam | |
| Length of Crest Perpendicular to | |
| Flow (feet) - | 20.0 |
| Crest Elevation (ft. M.S.L.) - | 1416.0 |
| Gates - | None |
| Downstream Channel - Steep and narrow | |
- j. Outlet Works -
- | | |
|--|------|
| | None |
|--|------|

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

Information reviewed for preparation of this report consisted of the Pennsylvania Department of Environmental Resources' (PennDER) File No. 8-27.

- 1) Inspection report from the Water Supply Commission of Pennsylvania, indicating a stone fill dam 30 feet long and 3 feet high (dated 9 September 1919).
- 2) Plans of bridge and dam by Charles F. May (dated 3 February 1935).
- 3) Application to the Water and Power Resources Board, from Charles F. May, to raise the level of the pond for recreational fishing (dated 8 February 1935).
- 4) Memorandum stating that the dam is 15 feet high, and Mr. May, the owner, should secure the services of an engineer to prepare plans on raising the water level 5-8 feet (dated 16 October 1935).
- 5) Complaint to the Department of Forests and Waters, from Levi R. Colwell, Sr., Wellsburg, New York, that the pond has been drained and washed out the bridge for the township road along the crest of the dam (dated 18 February 1937).
- 6) Various correspondence between the Highway Department, Department of Forests and Waters, and the Ridgebury Township Supervisors concerning rebuilding the bridge over the spillway for the township road. No final agreement was ever stated. (Dated 17 March 1952 through 30 September 1952).
- 7) The latest inspection report, dated 17 September 1965, filed by PennDER, Division of Dams and Encroachments. Brush growing on the embankment with the general condition being good.
- 8) Memorandum by a PennDER representative, dated 14 September 1972, stating the dam had been rebuilt ten years previously, and that it was in good condition. Photos included showed

the spillway discharge channel intact with minor erosion at the downstream end.

2.2 CONSTRUCTION

The original designer and contractor are unknown. The dates and plans for subsequent modifications to this structure are not available, with the exception of the plans dated 3 February 1935.

2.3 OPERATION

No formal records are available for operation of the dam and reservoir. The spillway is uncontrolled, and the reservoir is typically at the spillway crest level.

2.4 EVALUATION

- a. Availability - The information reviewed is readily available from PennDER File No. 8-27.
- b. Adequacy - The information available, combined with the visual inspection measurements and observations, is adequate for a Phase I Inspection of this dam.
- c. Validity - There is no reason at the present time to doubt the validity of the available engineering data.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

- a. General - The inspection was performed on 31 March 1981. The weather was cloudy with temperatures in the low 50's. The dam and appurtenant structures were found to be in poor overall condition at the time of inspection. Noteworthy deficiencies observed during the visual inspection are described in the following paragraphs. The complete visual inspection check list, field sketch, top of dam profile, and typical cross section are presented in Appendix A.
- b. Dam - Two seeps were observed at the downstream toe of the dam, and one boil was observed approximately 20 feet beyond the toe of the dam (see Field Sketch in Appendix A). A depression 3 feet in diameter and 2 feet deep and a 6-inch diameter depression were observed on the upstream crest. Trees and brush are growing on the upstream and downstream slopes of the embankment.
- c. Appurtenant Structures - The approach channel is clogged with rock fragments, and light vegetation. The discharge apron has collapsed, and the remaining training wall has been undermined by erosion. The joints in the side of the culvert are open. There is erosion behind the wingwalls on the upstream and downstream ends of the box culvert.
- d. Reservoir Area - The reservoir slopes are steep on the right side and gently sloping on the left side. No signs of instability were observed. Sedimentation is not believed to be a problem.
- e. Downstream Channel - The channel directly below the dam is severely eroded. The downstream channel is steep and passes through a narrow valley. A road passes along the crest of the dam.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no formal procedures for operating the reservoir or evacuating the downstream area in case of an impending emergency. It is recommended that formal emergency procedures be adopted, prominently displayed, and furnished to all operating personnel.

4.2 MAINTENANCE OF DAM

There are no formal records of maintenance or formal procedures for evaluating the necessity of maintenance for the structure. It is recommended that formal inspection procedures be developed.

4.3 MAINTENANCE OF OPERATING FACILITIES

Maintenance is unscheduled and is considered to be inadequate. It is recommended that a formal operation and preventive maintenance schedule be developed and implemented.

4.4 DESCRIPTION OF ANY WARNING SYSTEM

There is no warning system in the event of dam failure. It is recommended that an emergency warning system be developed.

4.5 EVALUATION OF OPERATIONAL ADEQUACY

The current operation and maintenance are inadequate. It is recommended that a formal maintenance and operations manual be prepared for the dam.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

- a. Design Data - No hydrologic or hydraulic design calculations are available for Miller's Pond Dam.
- b. Experience Data - No information concerning the effects of significant floods on the dam is available.
- c. Visual Observations - No problems, with the exception of the discharge apron, were observed during the visual inspection which would indicate that the dam and appurtenant facilities could not perform satisfactorily during a flood event. The two upstream dams are not considered to have a significant effect on Miller's Pond Dam.
- d. Overtopping Potential - Miller's Pond Dam is a "Small" size - "Low" hazard dam requiring evaluation for a Spillway Design Flood (SDF) in the range of the 50-year flood to the 100-year flood. The 100-year flood was chosen as the SDF.

Using material from "The Hydrologic Study - Tropical Storm Agnes" prepared by the Corps of Engineers in New York City, the peak inflow to the impoundment for the 100-year flood was calculated to be 2750 c.f.s. The peak inflow to the impoundment for the 100-year flood was also calculated to be 1167 c.f.s. using material from "Water Resources Bulletin, Bulletin No. 13, Floods in Pennsylvania", prepared by the Department of Environmental Resources, Commonwealth of Pennsylvania. Averaging these two methods produced a peak inflow of 1910 c.f.s., which was used in this analysis. The spillway can safely pass 3655 c.f.s. without overtopping the dam. Because the peak inflow to the impoundment is less than the spillway capacity, the spillway of the dam is capable of passing the 100-year flood without overtopping the dam.

- e. Spillway Adequacy - As outlined in the above analysis, the spillway will pass the required SDF; therefore, the spillway is considered "adequate."

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

- a. Visual Observations - The spillway discharge apron and training walls have been undermined and destroyed. This structure should be replaced. The seepage and depressions on the upstream slope indicate that "piping" of the embankment materials may be occurring. However, the depressions on the upstream slope may be from "piping" or from the settlement of voids from random dumping of the upstream slope fill from the crest of the dam. It is recommended that the seepage be monitored.
- b. Design and Construction Data - Calculations of slope and structural stability are unavailable for review. The slopes have had a history of satisfactory performance with only minor sloughing of surficial materials. The dam cross section indicates a downstream slope of 1.43H:1V at the steepest point of the downstream slope. Other sections of the embankment visually appear to be flatter. Generally, the history of satisfactory slope performance indicates that the slopes have a factor of safety against sliding greater than one, and that further assessments of stability are not required as a result of the Phase I Inspection program.
- c. Operating Records - There are no operational functions of any components of this dam. The current maintenance procedures are considered inadequate.
- d. Post Construction Changes - Raising of the height and section of the dam has apparently been performed without the benefit of a PennDER permit or engineering input. Other changes performed do not appear to adversely affect the structural stability of the dam.
- e. Seismic Stability - The dam is located in seismic Zone 1 of the "Seismic Zone Map of the Contiguous United States," Figure 1, Page D-30, "Recommended Guidelines for Safety Inspection of Dams." This is a zone of minor seismic activity. Therefore, further consideration of the seismic stability is unwarranted.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

- a. Safety - Miller's Pond Dam was found to be in poor overall condition at the time of inspection. Miller's Pond Dam is a "Low" hazard - "Small" size dam requiring a spillway capacity in the range of the 50-year flood to the 100-year flood. The 100-year flood was chosen as the SDF. As presented in Section 5, the spillway and reservoir are capable of passing the 100-year flood without overtopping the dam. Therefore, the spillway is considered "adequate."

Two seeps, approximately 5 g.p.m. and 1 g.p.m., and a boil are located near the downstream toe of the dam. These seepage areas should be monitored.

- b. Adequacy of Information - The information available and the observations and measurements made during the field inspection are considered sufficient for the Phase I Inspection Report.
- c. Urgency - The owner should initiate the remedial work discussed in paragraph 7.2 as soon as possible.
- d. Necessity for Additional Data/Evaluation - No additional evaluation is necessary.

7.2 RECOMMENDATIONS/REMEDIAL MEASURES

The inspection revealed certain items of remedial work which should be performed by the owner without delay. These include:

- 1) Monitor the two areas of seepage at regular intervals and during periods of high reservoir levels for turbidity and/or increase in flow, which may indicate potential for the piping of embankment material. If turbidity or increased flows are noted, a qualified geotechnical engineering firm should be retained to recommend remedial measures.
- 2) Fill, compact, and seed the depressions on the crest of the dam.
- 3) Cut all trees and brush on the embankment at ground level. All trees with a trunk diameter greater than 3 inches should have their root

systems removed. All resultant areas of erosion and cavities should be filled, graded, compacted, and seeded.

- 4) Clear the spillway approach channel of all debris and provide with erosion protection.
- 5) Repair the discharge apron and training walls.
- 6) Fill and seed the areas of erosion behind the wingwalls.
- 7) Protect the channel immediately downstream from the embankment with erosion protection.
- 8) Provide means to draw down the reservoir during an emergency.

In addition, the following operational measures are recommended to be undertaken by the owner:

- 1) Develop a detailed emergency operation and warning plan.
- 2) During periods of unusually heavy rainfall, provide around-the-clock surveillance of the dam.
- 3) Activate the emergency operation and warning system when warning of a storm of major proportions is given by the National Weather Service.

It is further recommended that formal inspection, maintenance, and operational procedures and records be developed and implemented. These should be included in a formal maintenance and operations manual for the dam.

APPENDIX A

**VISUAL INSPECTION CHECK LIST, FIELD SKETCH,
TOP OF DAM PROFILE, AND TYPICAL CROSS-SECTION**

Check List
Visual Inspection
Phase 1

Name of Dam Miller's Pond County Bradford State Pennsylvania Coordinates Lat. N 41° 54.9'
 NDI No. PA 01004
 Pennder No. 8-27 Long. W 76° 43.0'

Date of Inspection 31 March 1981 Weather Cloudy Temperature 50° F

Pool Elevation at Time of Inspection 1416.1* M.S.L. Tailwater at Time of Inspection 1403.7 M.S.L.

*All elevations are referenced to the spillway crest, elevation 1416.0 ft. M.S.L., as estimated from the USGS 7.5' topographic quadrangle, Bentley Creek, PA.

Inspection Personnel:

Michael Baker, Jr., Inc.:

James G. Uliniski
 Jeff L. Sawyer
 Gary W. Todd

Owner's Representatives:

Gary W. Todd Recorder

CONCRETE/MASONRY DAMS N/A

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
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LEAKAGE

STRUCTURE TO
ABUTMENT/EMBANKMENT
JUNCTIONS

DRAINS

WATER PASSAGES

FOUNDATION

CONCRETE/MASONRY DAMS N/A

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SURFACE CRACKS
CONCRETE SURFACES

STRUCTURAL CRACKING

VERTICAL AND HORIZONTAL
ALIGNMENT

MONOLITH JOINTS

CONSTRUCTION JOINTS

EMBANKMENT

Name of Dam MILLER'S POND DAM
 NDI No. PA 01004

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SURFACE CRACKS

None observed.

UNUSUAL MOVEMENT OR
CRACKING AT OR BEYOND
THE TOE

None observed.

SLOUGHING OR EROSION OF
EMBANKMENT AND ABUTMENT
SLOPESFill in erosion gullies
and reseed.

There is an eroded area behind
and below the left side of the
culvert wing wall on the upstream
side of the embankment. There is
an eroded area behind the right
downstream culvert wing wall.

E-BANKMENT

Name of Dam MILLER'S POND DAM
NDI No. PA 01004

<u>VISUAL EXAMINATION OF</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
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<u>VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST</u>	There is good vertical and horizontal alignment.	
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<u>RIPRAP FAILURES</u>	No problems observed.	
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<u>VEGETATION</u>	Trees and brush are growing on the upstream and down- stream sides of the embank- ment.	Cut the trees and brush on the embankment and for ten ft. below the toe of the dam.
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EMBANKMENT

Name of Dam MILLER'S POND DAM
 NDI No. PA 01004

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	A gully has been washed at the upstream junction of the abutment on the right side.	Provide with erosion protection.
ANY NOTICEABLE SEEPAGE	Two areas of seepage were observed at the downstream toe near the right abutment. One seep approximately 1 g.p.m., one seep approximately 5 g.p.m. There is a boil 20 ft. below the toe of the embankment below the larger seep.	Monitor these areas.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed for the embankment.	

OUTLET WORKS - None observed

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

CRACKING AND SPALLING OF
CONCRETE SURFACES IN
OUTLET CONDUIT

INTAKE STRUCTURE

OUTLET STRUCTURE

OUTLET CHANNEL

EMERGENCY GATE

UNGATED SPILLWAY

Name of Dam: MILLER'S POND DAM
 NDI No. PA 01004

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE WEIR

The concrete box culvert appeared in good condition.

APPROACH CHANNEL

It is clogged with rock fragments and light vegetation.

Clear obstructions from the channel.

DISCHARGE CHANNEL

The discharge apron is destroyed. There are voids under right remaining downstream training wall. The left downstream abutment soils are capable of liquifying when fully (super) saturated.

There is evidence that clay pipe underdrains under apron. The concrete slab at culvert has dropped 2" near end and may have started to be undermined. There is major erosion in the downstream discharge channel.

BRIDGE AND PIERS

There is a joint open on the sides of the culvert. There are two spots on soffit where minor seepage is coming through.

GATED SPILLWAY

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
-----------------------	--------------	----------------------------

CONCRETE SILL

APPROACH CHANNEL

DISCHARGE CHANNEL

BRIDGE AND PIERS

GATES AND OPERATION
EQUIPMENT

INSTRUMENTATION

Name of Dam: MILLER'S POND DAM

NDI No. PA 01004

<u>VISUAL EXAMINATION</u>	<u>OBSERVATIONS</u>	<u>REMARKS OR RECOMMENDATIONS</u>
---------------------------	---------------------	-----------------------------------

MONUMENTATION/SURVEYS	None observed.	
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OBSERVATION WELLS	None observed.	
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WEIRS	None observed.	
-------	----------------	--

PIEZOMETERS	None observed.	
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OTHER	None.	
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RESERVOIR

Name of Dam: MILLER'S POND DAM

NDI No. PA 01004

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SLOPES

The reservoir slopes on the right side are steep (300-450). The slopes on the left side are gentle (50-100). No signs of instability were observed.

SEDIMENTATION

Sedimentation is not believed to be a problem.

DOWNSTREAM CHANNEL

Name of Dam: MILLER'S POND DAM
NDI NO. PA 01004

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No debris was present in the channel. The channel directly below the embankment is severely eroded.	

SLOPES

The downstream channel has steep slopes through a narrow channel.

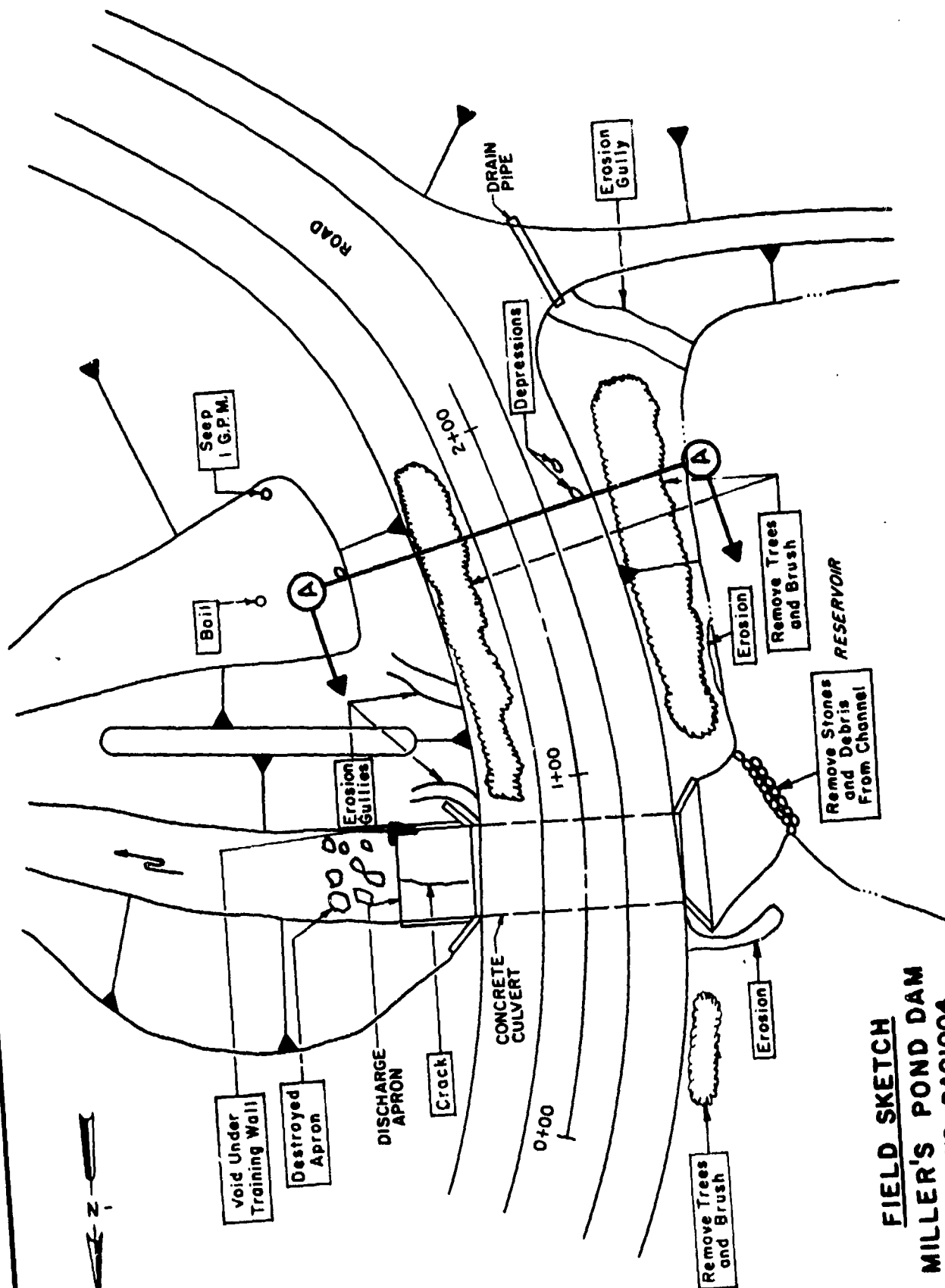
APPROXIMATE NO.
OF HOMES AND
POPULATION

7800 ft. below the dam are several homes ranging from 5 ft. to 10 ft. above the stream bed.

FIELD ONE
MILLER'S POND DAM

INDEX NO. PA01004

PennDer NO. 8-27
GRAPHIC - NOT TO SCALE



MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

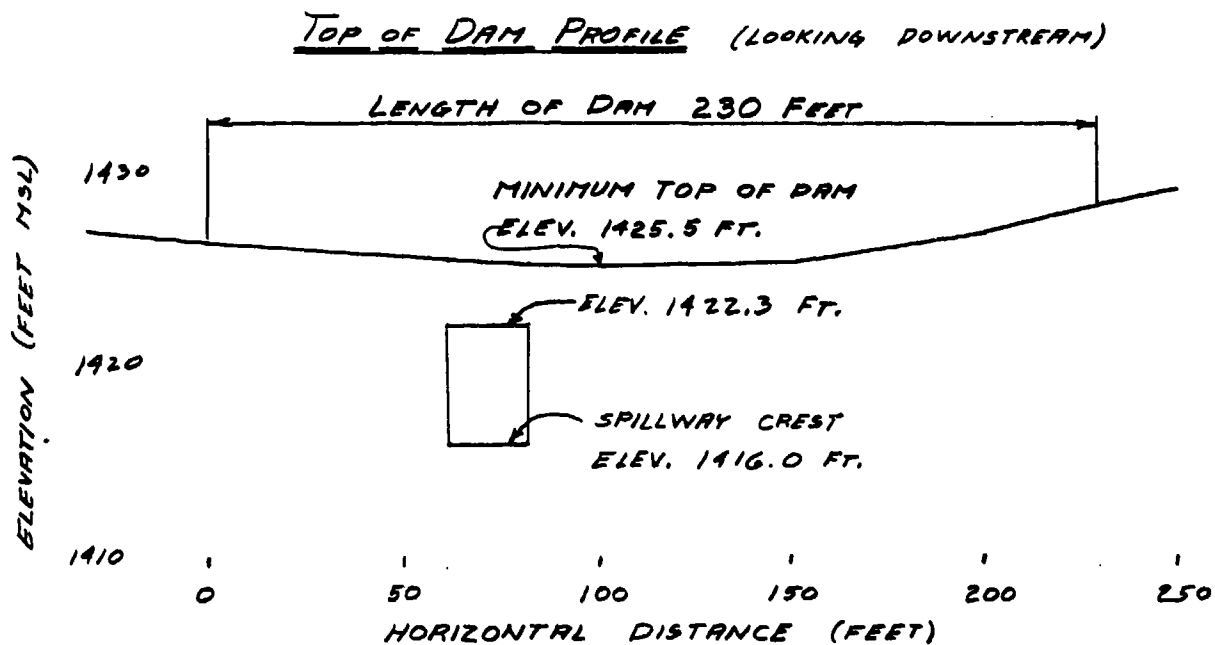
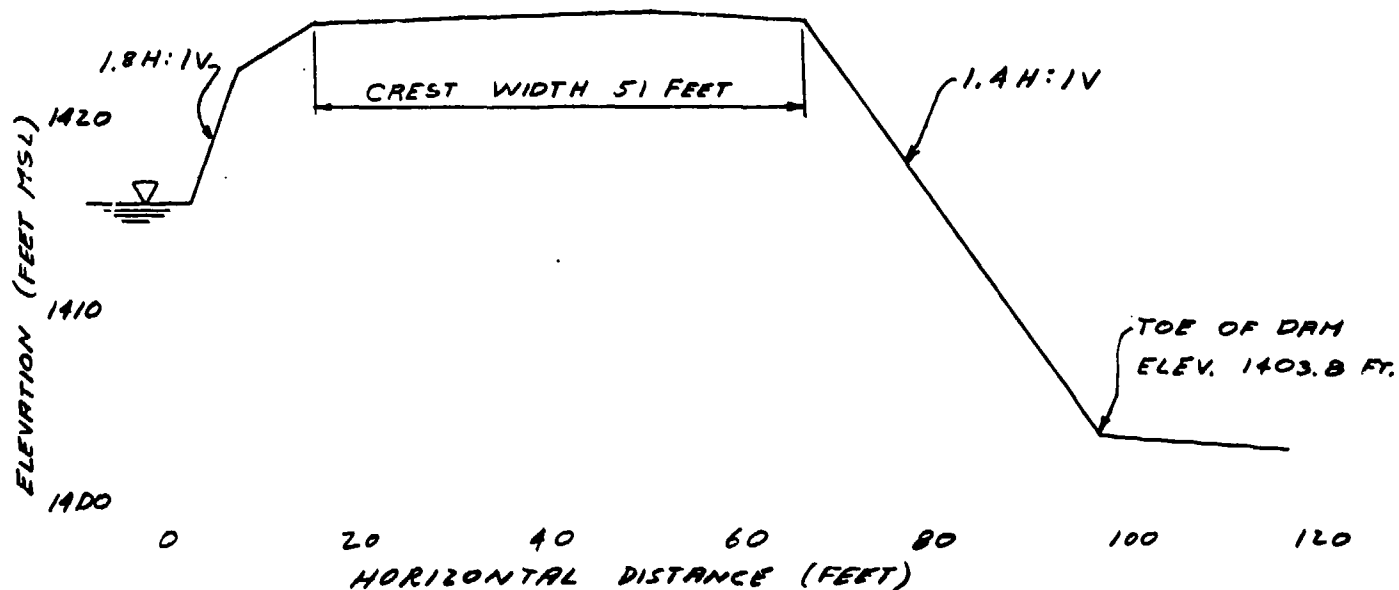
Box 280

Beaver, Pa. 15009

MILLER'S POND DAM

TOP OF DAM PROFILE
TYPICAL CROSS-SECTION

DATE OF INSPECTION: 31 March 1981

TYPICAL CROSS SECTION @ STATION 1+75

APPENDIX B
ENGINEERING DATA CHECK LIST

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

Name of Dam: Miller's Pond Dam
NDI No. PA 01004

ITEM	REMARKS
PLAN OF DAM	See Appendix E, Plate 3 of this report.
REGIONAL VICINITY MAP	A USGS 7.5 minute topographic quadrangle, Bentley Creek, Pennsylvania, was used to prepare the vicinity map which is enclosed in this report as the Location Plan (Plate 1) Appendix E.
CONSTRUCTION HISTORY	The designer and contractor are unknown.
TYPICAL SECTIONS OF DAM	See Appendix E, Plate 4 of this report.
HYDROLOGIC/HYDRAULIC DATA	No information available.
OUTLETS - PLAN	None.
- DETAILS	None.
- CONSTRAINTS	None.
- DISCHARGE RATINGS	None.
RAINFALL/RESERVOIR RECORDS	No records are maintained.

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

ITEM	REMARKS
DESIGN REPORTS	None available.
GEOLOGY REPORTS	No geology reports are available for the dam. See Appendix F for the regional geology.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available.
POST-CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	No information available.

Name of Dam: MILLER'S POND DAM
 NDI No. PA 01004

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	The height of the dam has been raised several times, and the spillway has been modified. However, there are no records of dates when these changes were made.
HIGH POOL RECORDS	No information available.
POST-CONSTRUCTION ENGINEERING STUDIES AND REPORTS	The latest inspection of 14 September 1972 indicated that the dam was in good condition with minor erosion at the downstream end of the spillway discharge channel.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported in the available information.
MAINTENANCE OPERATION RECORDS	No formal maintenance records are maintained.

Name of Dam: MILLER'S POND DAM
NDI No. PA 01004

ITEM	REMARKS
SPILLWAY PLAN, SECTIONS, and DETAILS	No information available.
OPERATING EQUIPMENT PLANS & DETAILS	None.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 2.66 sq. mi. (Primarily forested)

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1416.0 Ft. M.S.L.

(230 Ac.-Ft.)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): 1425.5 Ft. M.S.L.

(684 Ac.-Ft.)

ELEVATION MAXIMUM DESIGN POOL: Unknown

ELEVATION TOP DAM: 1425.5 Ft. M.S.L. (Minimum top of dam)

SPILLWAY:

- a. Crest Elevation 1416.0 Ft. M.S.L.
- b. Type Concrete Box Culvert
- c. Width of Crest Parallel to Flow 39.8 Ft.
- d. Length of Crest Perpendicular to Flow 20 Ft.
- e. Location Spillover Center of embankment
- f. Number and Type of Gates None

OUTLET WORKS: None

- a. Type _____
- b. Location _____
- c. Entrance Inverts _____
- d. Exit Inverts _____
- e. Emergency Drawdown Facilities _____

HYDROMETEOROLOGICAL GAGES: None

- a. Type _____
- b. Location _____
- c. Records _____

MAXIMUM NON-DAMAGING DISCHARGE Unknown

APPENDIX C
PHOTOGRAPH LOCATION PLAN AND PHOTOGRAPHS

DETAILED PHOTOGRAPH DESCRIPTIONS

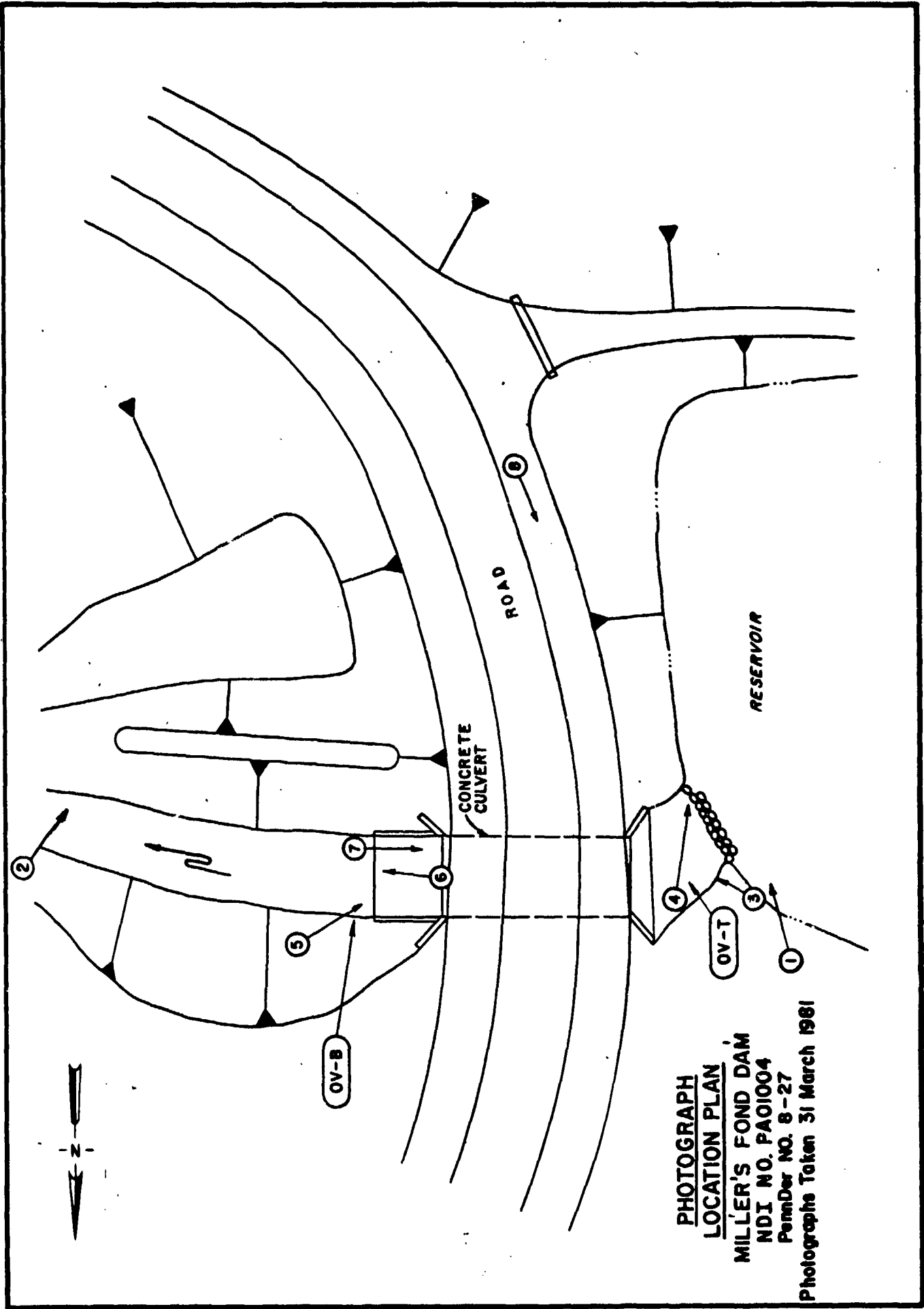
Overall View of Dam

- Top Photo (OV-T) - Overall View of Upstream Side of Embankment and Spillway
- Bottom Photo (OV-B) - Overall View of Downstream Side of Embankment and Spillway

Photograph Location Plan

- Photo 1 - View of Upstream Slope From Left Abutment
- Photo 2 - View of Downstream Slope From Left Abutment
- Photo 3 - View of Spillway Entrance From Upstream
- Photo 4 - View of Low Flow Channel Into Spillway
- Photo 5 - View of Downstream Discharge Apron of Spillway
- Photo 6 - View of Downstream Channel
- Photo 7 - View of Spillway (Culvert) - Note Approximately Two Inch Vertical Separation at Joint
- Photo 8 - View of One of the Depressions (Vertical Holes) Along Upstream Crest of the Embankment

Note: Photographs were taken on 31 March 1981.



**PHOTOGRAPH
LOCATION PLAN**
MILLER'S FOND DAM
NDI NO. PA01004
PennDer NO. 8-27
Photographs Taken 31 March 1981

MILLER'S POND DAM



PHOTO 1. View of Upstream Slope from Left Abutment



PHOTO 2. View of Downstream Slope from Left Abutment

MILLER'S POND DAM



PHOTO 3. View of Spillway Entrance from Upstream



PHOTO 4. View of Low Flow Channel Into Spillway

MILLERS POND DAM



PHOTO 5. View of Downstream Discharge Apron of Spillway

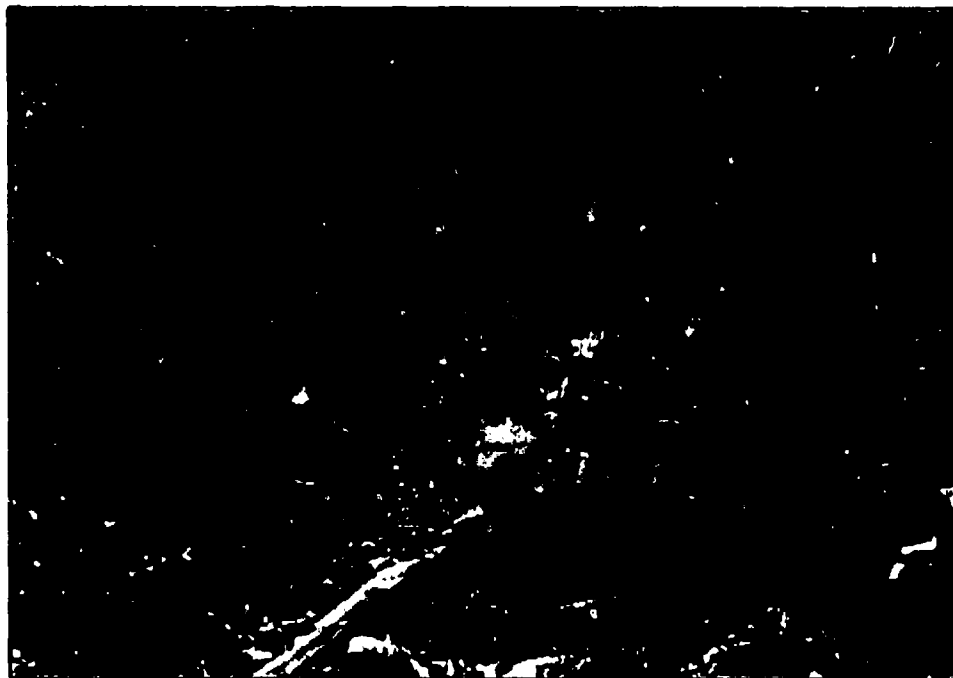


PHOTO 6. View of Downstream Channel

MILLER'S POND DAM

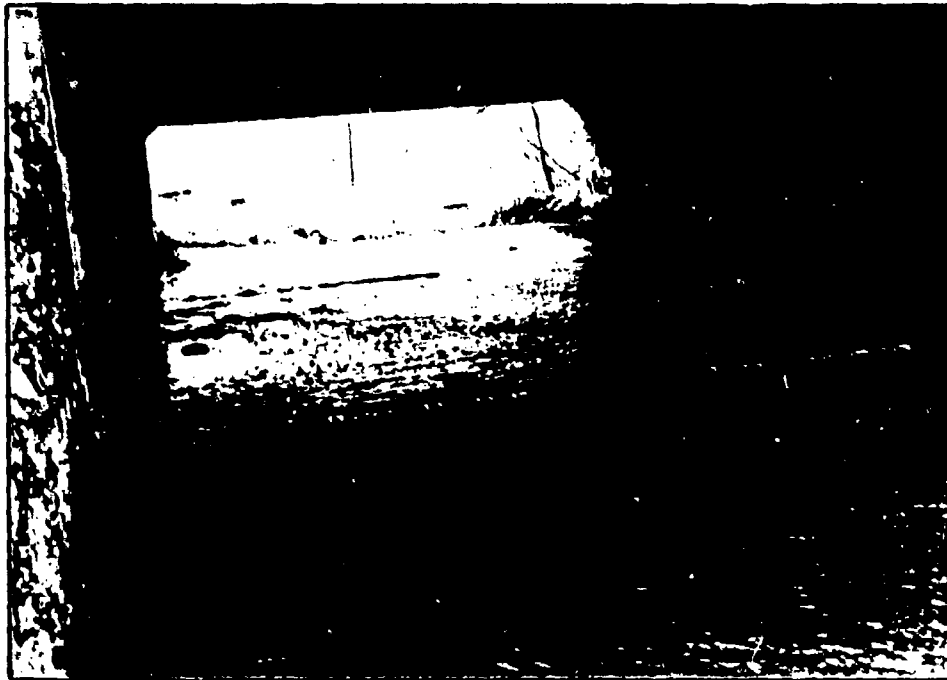


PHOTO 7. View of Spillway (Culvert)
Note: Approximately Two Inch Vertical Separation at Joint

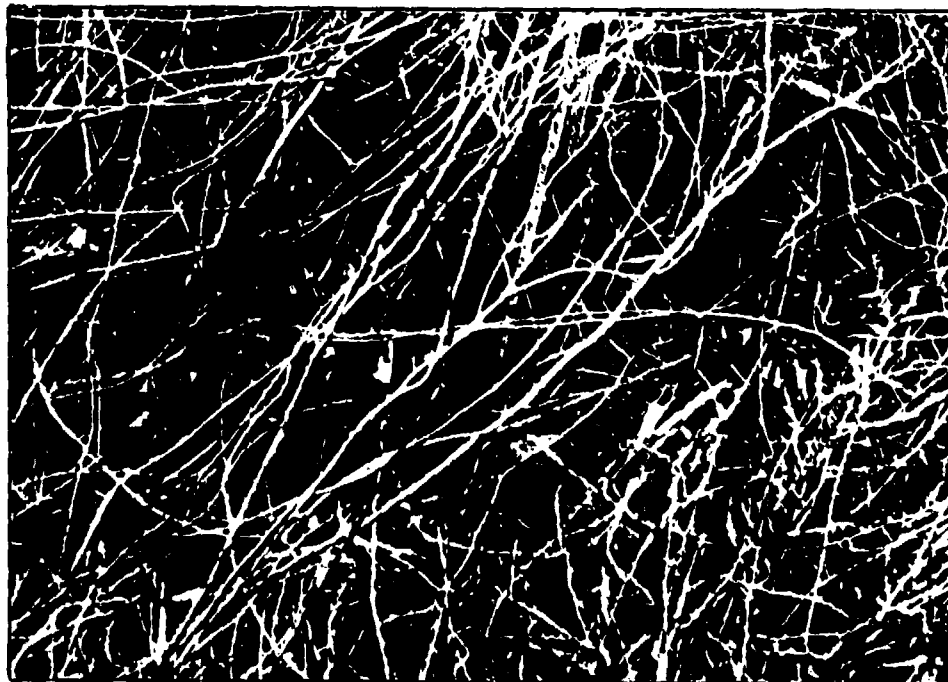


PHOTO 8. View of One of the Depressions (Vertical Holes)
Along Upstream Crest at the Embankment

APPENDIX D
HYDROLOGIC AND HYDRAULIC COMPUTATIONS

MICHAEL BAKER, JR., INC.

THE BAKER ENGINEERS

Box 280
Beaver, Pa. 15009

Subject MILLER'S POND DAM

S.O. No. _____

APPENDIX D - HYDROLOGIC AND

Sheet No. _____ of _____

HYDRAULIC COMPUTATIONS

Drawing No. _____

Computed by GWT

Checked by _____

Date 4/10/81

<u>SUBJECT</u>	<u>PAGE</u>
HYDROLOGY AND HYDRAULIC DATA BASE	1
HYDRAULIC DATA	2
DRAINAGE AREA AND CENTROID MAP	3
TOP OF DAM PROFILE AND CROSS SECTION	4
SPILLWAY DISCHARGE RATING	5
100-YEAR DISCHARGE CALCULATION	6
RESERVOIR STORAGE CAPACITY	8

PREFACE

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

The hydrologic determinations presented in this Phase I Inspection Report are based on the use of a Snyder's unit hydrograph developed by the U.S. Army Corps of Engineers. Due to the limited number of gaging stations available in this hydrologic region and the wide variations of watershed slopes, the Snyder's coefficients may yield results of limited accuracy for this watershed. As directed however, a further refinement of these coefficients is beyond the scope of this Phase I Investigation.

In addition, the conclusions presented pertain to present conditions, and the effect of future development on the hydrology has not been considered.

HYDROLOGY AND HYDRAULIC ANALYSIS DATA BASE

NAME OF DAM: MILLER'S POND DAM

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.0 INCHES/24 HOURS

STATION	1	2	3	4	5
Station Description	MILLER'S POND DAM				
Drainage Area (square miles)	2.66				
Cumulative Drainage Area (square miles)	2.66				
Adjustment of PMP for Drainage Area (%) ⁽²⁾					
6 Hours					
12 Hours					
24 Hours					
48 Hours					
Snyder Hydrograph Parameters					
Zone (1)	11				
C_p/C_t (2)	0.62/1.5				
L (miles) (3)	3.50				
L_{ca} (miles) ⁽³⁾	1.48				
$t_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	2.46				
Spillway Data					
Crest Length (ft)	20				
Freeboard (ft)	9.5				
Discharge Coefficient	RATING CURVE				
Exponent	DEVELOPED ON SHEET 5				

- (1) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
- (2) Snyder's Coefficients.
- (3) L = Length of longest water course from outlet to basin divide.
 L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

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Subject PA. Dam Insp. S.O. No. 13837-00-ARA-21
Miller Pond Dam Sheet No. 2 of 2
HYDRAULIC DATA Drawing No. _____
Computed by GBD Checked by GWT Date 3/23/81

DRAINAGE AREA

GILLETT QUAD. 54.85
BENTLEY CREEK QUAD. 0.96 } $55.81/3 = 18.60 \text{ in}^2 = 1,708.0 \text{ Acres} = 2.66 \text{ mi}^2$

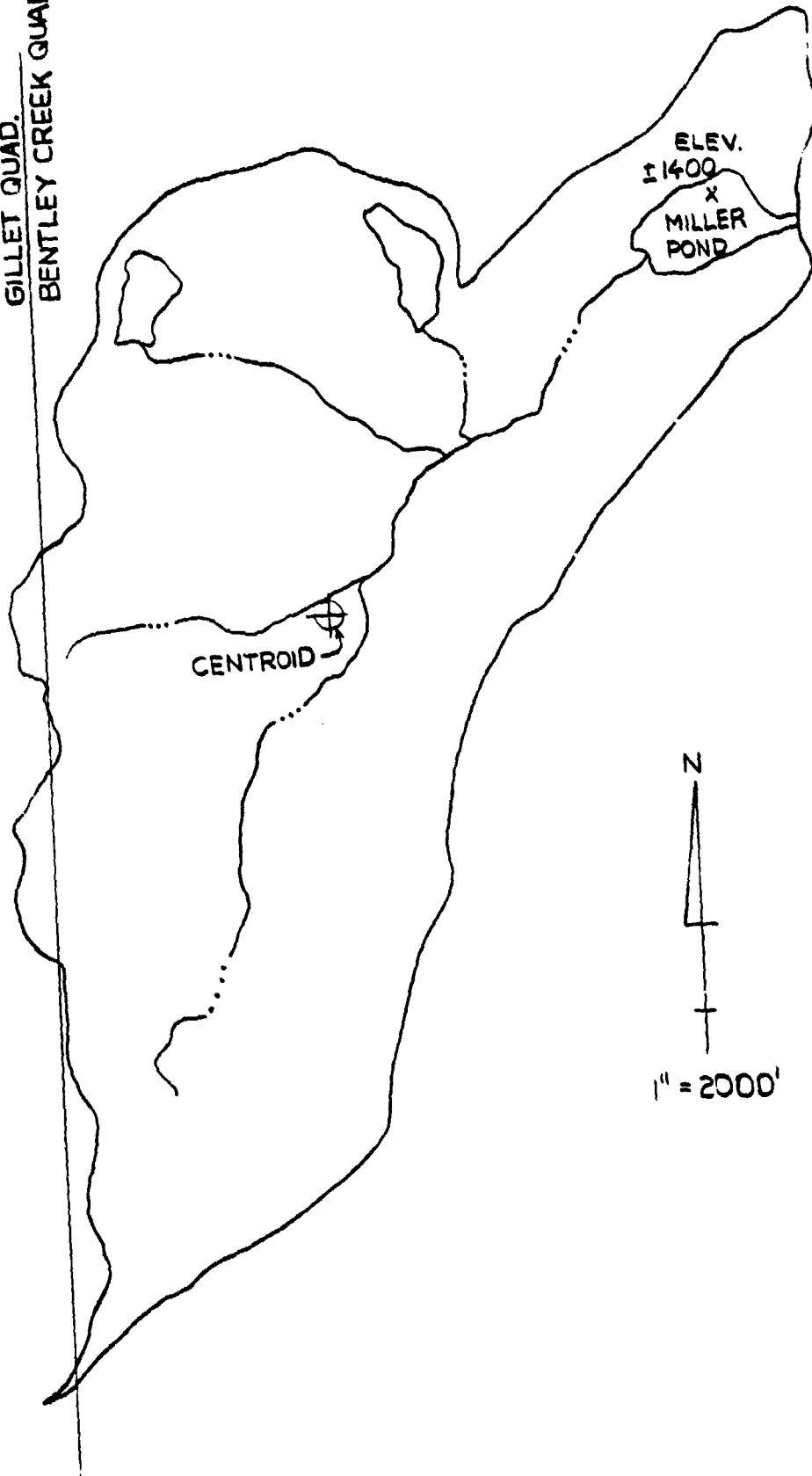
SURFACE AREAS

LAKE SURFACE @ El. $\pm 1400 - 1.16/3 = 0.39 \text{ in}^2 = 35.8 \text{ Acres} = 0.06 \text{ mi}^2$
El. $1420 - 1.60/3 = 0.53 \text{ in}^2 = 48.7 \text{ Acres} = 0.08 \text{ mi}^2$
El. $1440 - 2.44/3 = 0.81 \text{ in}^2 = 74.4 \text{ Acres} = 0.12 \text{ mi}^2$

WATERSHED LENGTHS

$L = 18,500 \text{ ft.} = 3.50 \text{ mi.}$
 $L_c = 7,800 \text{ ft.} = 1.48 \text{ mi.}$

GILLET QUAD.
BENTLEY CREEK QUAD.



MILLER POND DAM
DRAINAGE AREA AND CENTROID MAP

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Subject MILLERS POND DAM

S.O. No. _____

TOP OF DAM PROFILE AND

Sheet No. 4 of 8

TYPICAL CROSS SECTION

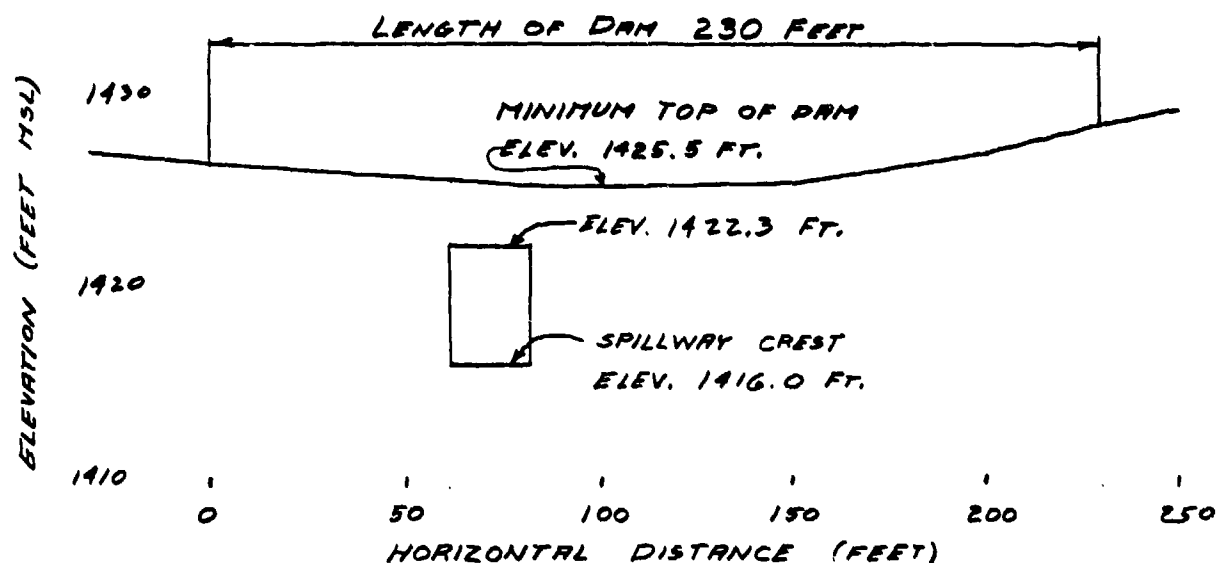
Drawing No. _____

Computed by GWT

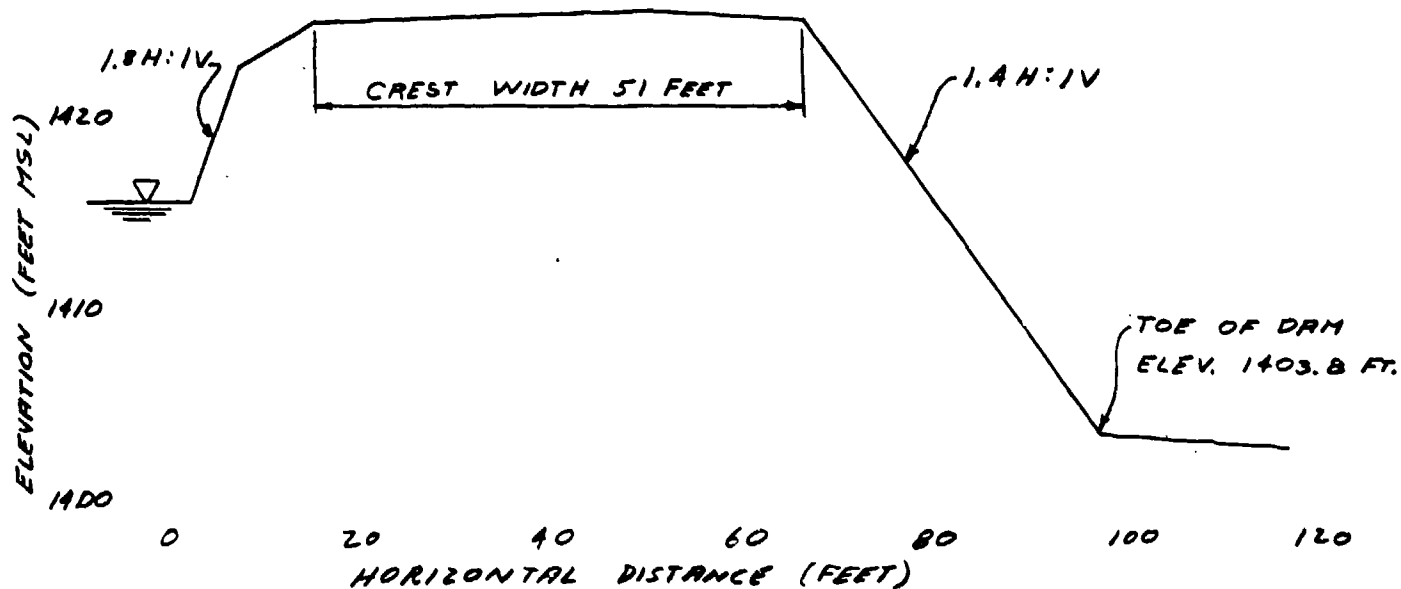
Checked by _____

Date 3/31/81

TOP OF DAM PROFILE (LOOKING DOWNSTREAM)



TYPICAL CROSS SECTION @ STATION 1+75



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Subject MILLERS POND

S.O. No. _____

SPILLWAY DISCHARGE RATING

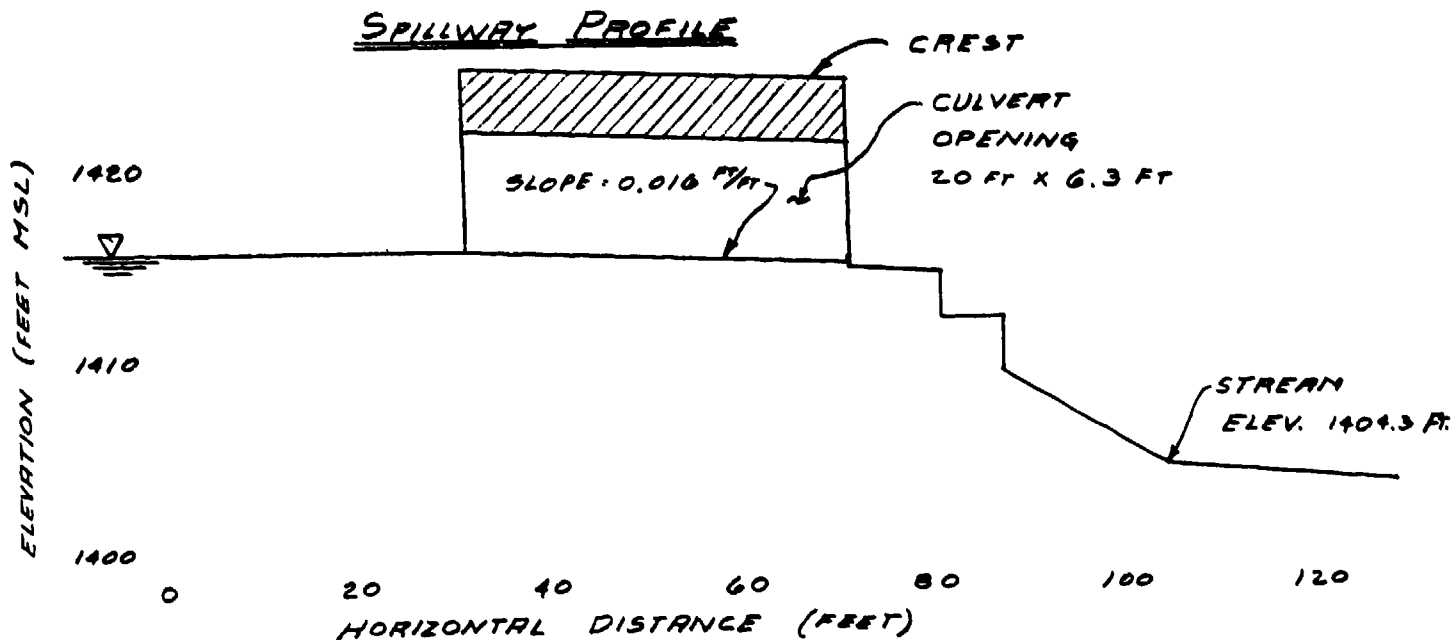
Sheet No. 5 of 8

Drawing No. _____

Computed by GWT

Checked by WDL

Date 3/31/81



SPILLWAY DISCHARGE RATING

USING MANNING EQUATION FOR FLOW

$$V = \frac{1.49}{n} R^{2/3} S^{1/2}$$

$n = 0.016$ MANNING ROUGHNESS COEFFICIENT FROM BRATER
+ KING PG. 7-22.

$R = \text{HYDRAULIC RADIUS} = \frac{\text{CROSS SECTIONAL AREA}}{\text{WETTED PERIMETER}} = \frac{A}{P}$

$S = \text{SLOPE} = 0.016 \text{ FT/FT}$

WATER SURFACE ELEV., (FT)	DEPTH (FT)	AREA (FT ²)	P (FT)	R	V (FT/SEC)	Q ₁ (CFS)
1416.0	0	0	0	0	0	0
1417.0	1.0	20.0	22.0	.91	11.06	221.3
1418.0	2.0	40.0	24.0	1.67	16.58	663.0
1419.0	3.0	60.0	26.0	2.31	20.57	1,234.4
1420.0	4.0	80.0	28.0	2.86	23.72	1,897.4
1421.0	5.0	100.0	30.0	3.33	26.25	2,624.8
1422.0	6.0	120.0	32.0	3.75	28.41	3,409.0
1422.3	6.3	126.0	32.6	3.87	29.01	3,655.4

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "THE HYDROLOGIC STUDY - TROPICAL STORM AGNES" PREPARED BY THE SPECIAL STUDIES BRANCH, PLANNING DIVISION, NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS, IN NEW YORK CITY.

DRAINAGE AREA - 2.66 SQ. MI.

① COMPUTE THE MEAN LOGARITHM

$$\log(Q_m) = C_m + 0.75 \log A$$

$\log(Q_m)$ = MEAN LOGARITHM OF ANNUAL FLOOD PEAKS

A = DRAINAGE AREA, SQ. MI. = 2.66

C_m = MAP COEFFICIENTS FOR MEAN LOG OF ANNUAL PEAKS FROM FIG. 21 = 2.2

$$\begin{aligned}\log(Q_m) &= 2.2 + 0.75 (\log 2.66) \\ &= 2.518\end{aligned}$$

② COMPUTE STANDARD DEVIATION

$$S = C_s - 0.05 (\log A)$$

S = STANDARD DEVIATION OF THE LOGARITHMS OF THE ANNUAL PEAKS.

C_s = MAP COEFFICIENT FOR STANDARD DEVIATION FROM FIG. 22 = .38

A = DRAINAGE AREA, SQ. MI., = 2.66

$$\begin{aligned}S &= .38 - 0.05 (\log 2.66) \\ &= 0.358\end{aligned}$$

③ SELECT SKEW COEFFICIENT FROM FIG. 23 = 0.28

$$\textcircled{4} \log(Q_{100}) = \log(Q_m) + K(P, g) S$$

$K(P, g)$ = STANDARD DEViate FOR A GIVEN EXCEEDENCE FREQUENCY PERCENTAGE (P) AND SKEW COEFFICIENT (g) FROM EXHIBIT 39 OF BEARD'S "STATISTICAL METHODS IN HYDROLOGY"

$$\log(Q_{100}) = 2.518 + 2.53 (0.358)$$

$$Q_{100} = 2653 \text{ CFS}$$

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Subject MILLER'S POND DAM

S.O. No. _____

100-YEAR DISCHARGE CALCULATIONSheet No. 7 of 8

Drawing No. _____

Computed by GWTChecked by WJLDate 6/19/81

THE INFLOW TO THE IMPOUNDMENT FOR THE 100-YEAR FLOOD WAS CALCULATED USING MATERIAL FROM "WATER RESOURCES BULLETIN, BULLETIN NO. 13, FLOODS IN PENNSYLVANIA", PREPARED BY THE DEPARTMENT OF ENVIRONMENTAL RESOURCES, COMMONWEALTH OF PENNSYLVANIA.

DRAINAGE BASIN FROM PLATE 1 - MODEL 2
REGRESSION EQUATION FROM TABLE 2

$$Q_T = CA^X$$

$$T = 100 \text{ YEARS}$$

$$C = 564$$

$$A = \text{DRAINAGE AREA, 2.66 SQ. MI.}$$

$$X = 0.744$$

$$Q_{100} = 564 (2.66)^{0.744}$$

$$Q_{100} = 1167 \text{ C.F.S.}$$

AVERAGING THE INFLOW FROM THIS METHOD AND THE PREVIOUS METHOD GIVES AN INFLOW OF 1910 C.F.S. TO THE IMPOUNDMENT. THE SPILLWAY CAN SAFELY PASS 3655 C.F.S. AT ELEVATION 1422.3 FEET WITHOUT OVERTOPPING THE DAM. SINCE THE PEAK INFLOW TO THE IMPOUNDMENT FROM THE DRAINAGE AREA IS LESS THAN THE SPILLWAY CAPACITY, THE SPILLWAY CAN SAFELY PASS THE SDF WITHOUT OVERTOPPING THE DAM.

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Subject MILLER'S POND DAM S.O. No. _____
RESERVOIR STORAGE CAPACITY Sheet No. 2 of 2
Drawing No. _____
Computed by GWT Checked by WD Date 6/1/81

<u>ELEVATION (FT) V.S. SURFACE AREA (ACRES)</u>	
1409.5	35.0 (ESTIMATED)
1416.0	35.0
1425.5	51.0

USING

$$V = \frac{h}{3} (A_1 + A_2 + \sqrt{A_1 A_2})$$

NORMAL POOL STORAGE (ELEV. 1416.0)

$$V = \frac{6.5}{3} (35.0 + 35.0 + \sqrt{(35.0)(35.0)})$$

$$V = 230 \text{ AC.-FT.}$$

TOP OF DAM STORAGE (ELEV. 1425.5 FT)

$$V = \frac{16.0}{3} (51.0 + 35.0 + \sqrt{(51.0)(35.0)})$$

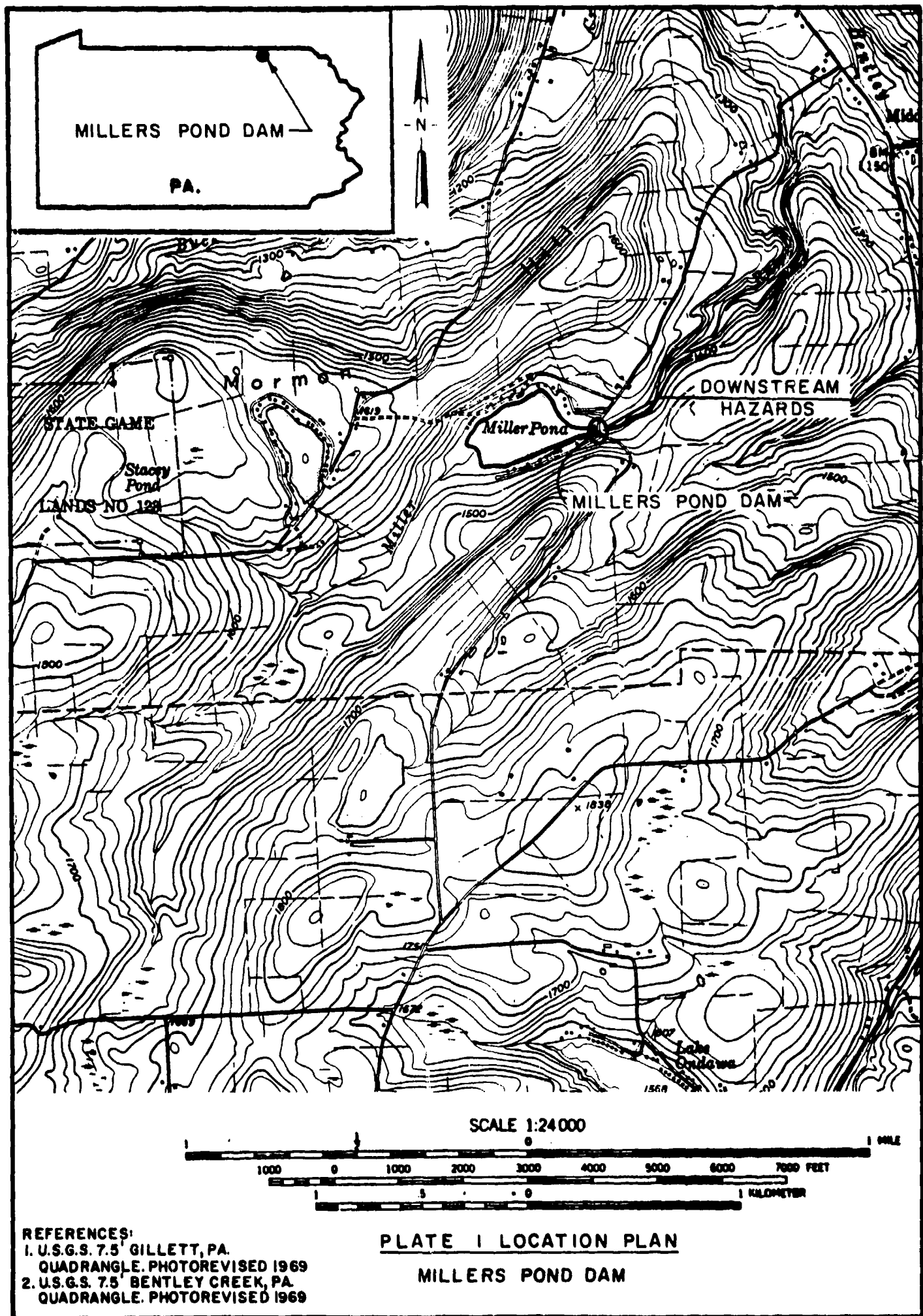
$$V = 684 \text{ AC.-FT.}$$

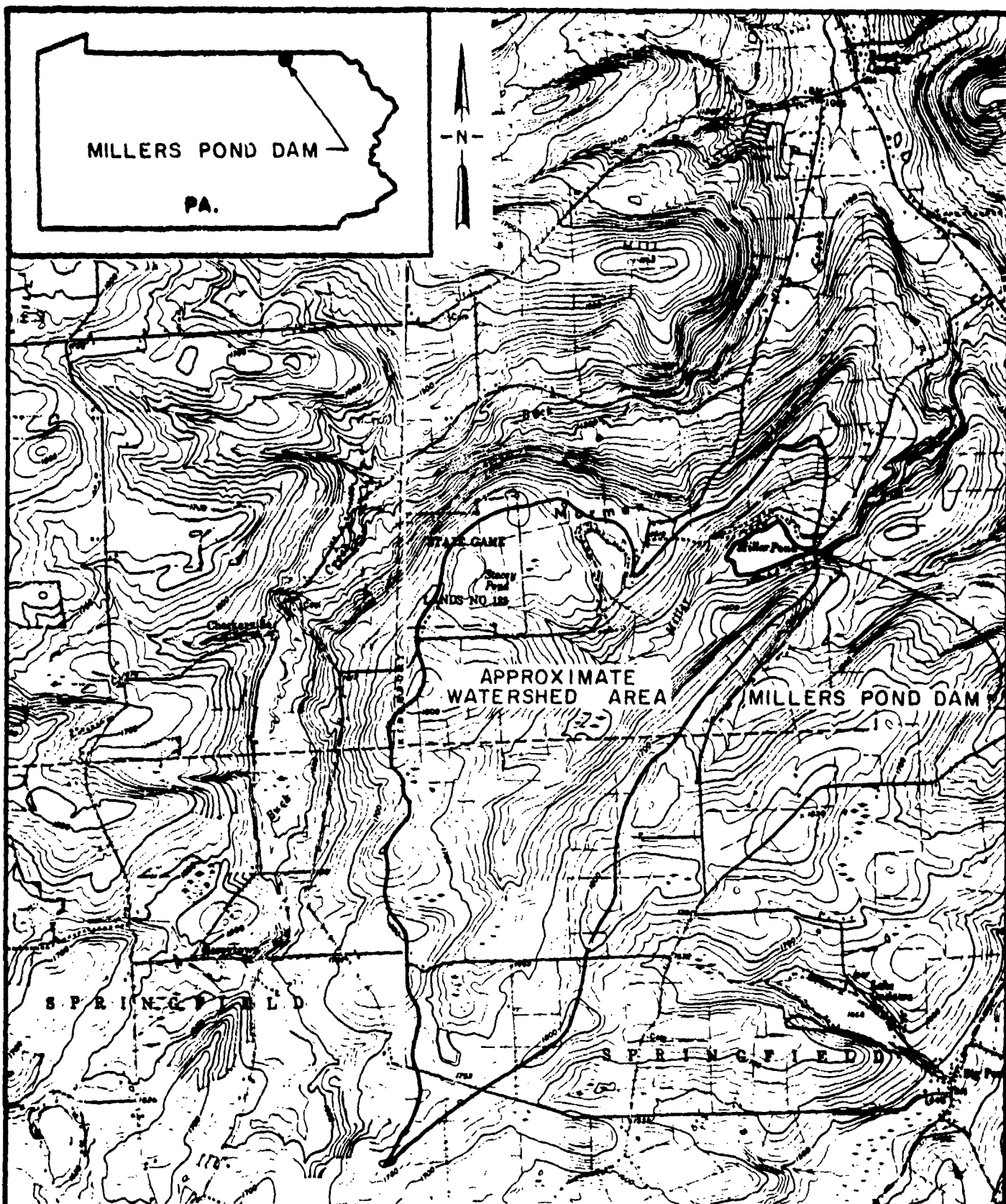
APPENDIX E

PLATES

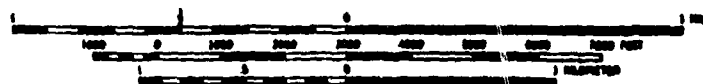
CONTENTS

- Plate 1 - Location Map
- Plate 2 - Watershed Map
- Plate 3 - Field Sketch from Visual Inspection
- Plate 4 - Top of Dam Profile and Typical Cross-Section from
Visual Inspection
- Plate 5 - Bridge and Dam



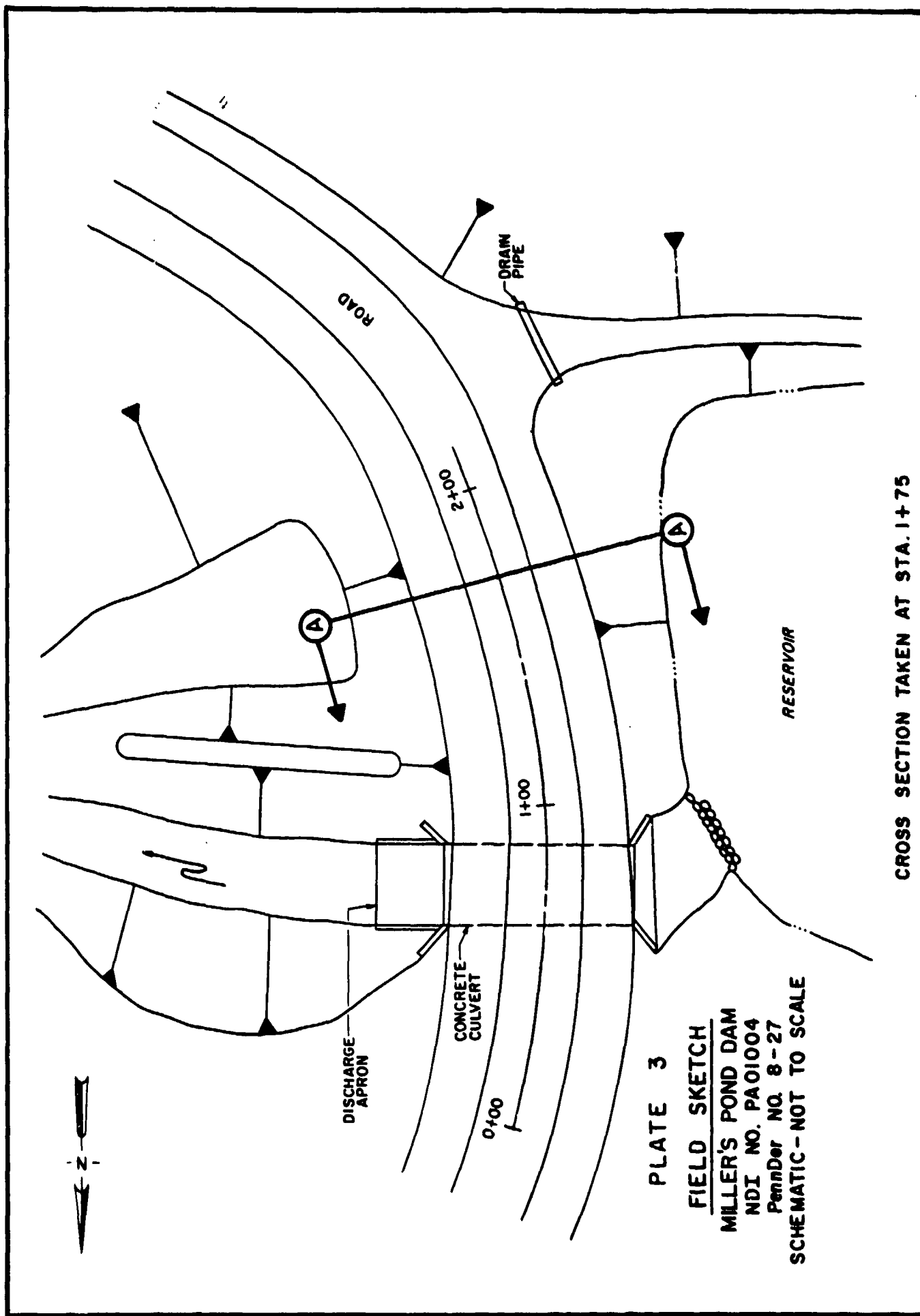


SCALE 1:36,900



REFERENCES:
1. U.S.G.S. 7.5' GILLET, PA.
QUADRANGLE. PHOTOREVISED 1969
2. U.S.G.S. 7.5' BENTLEY CREEK, PA.
QUADRANGLE. PHOTOREVISED 1969

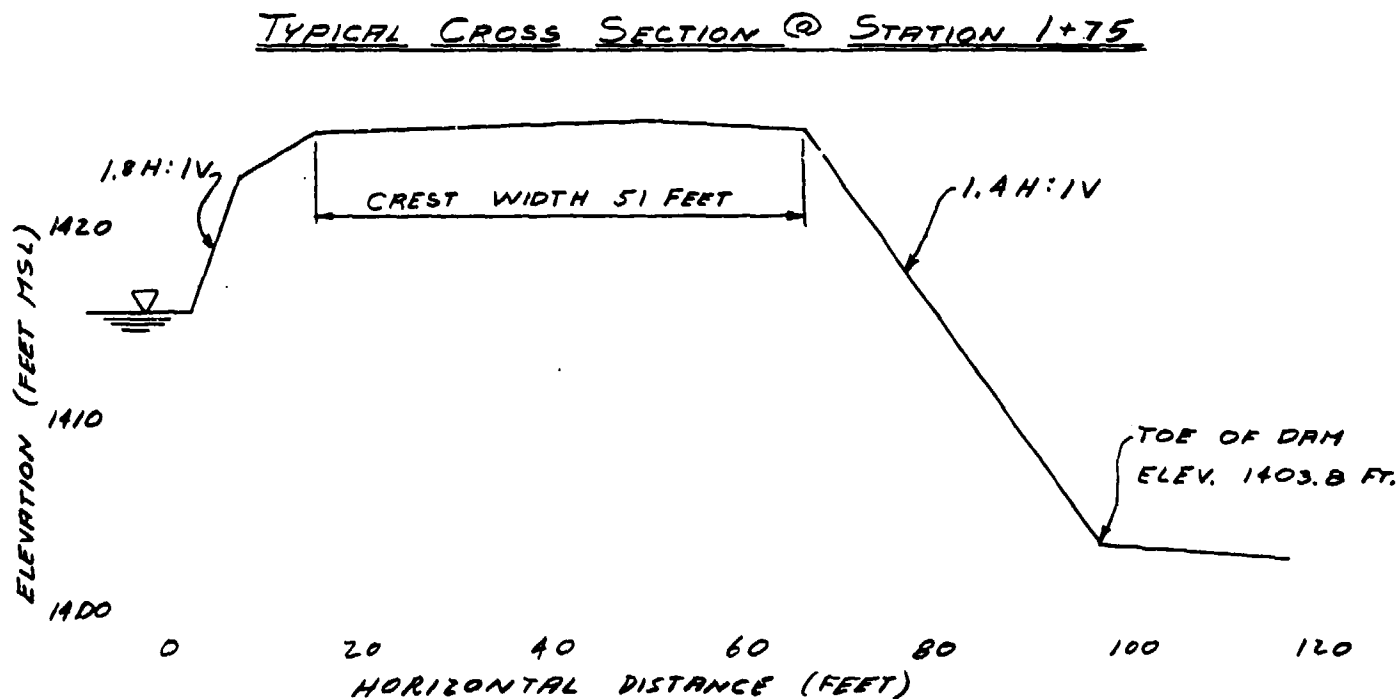
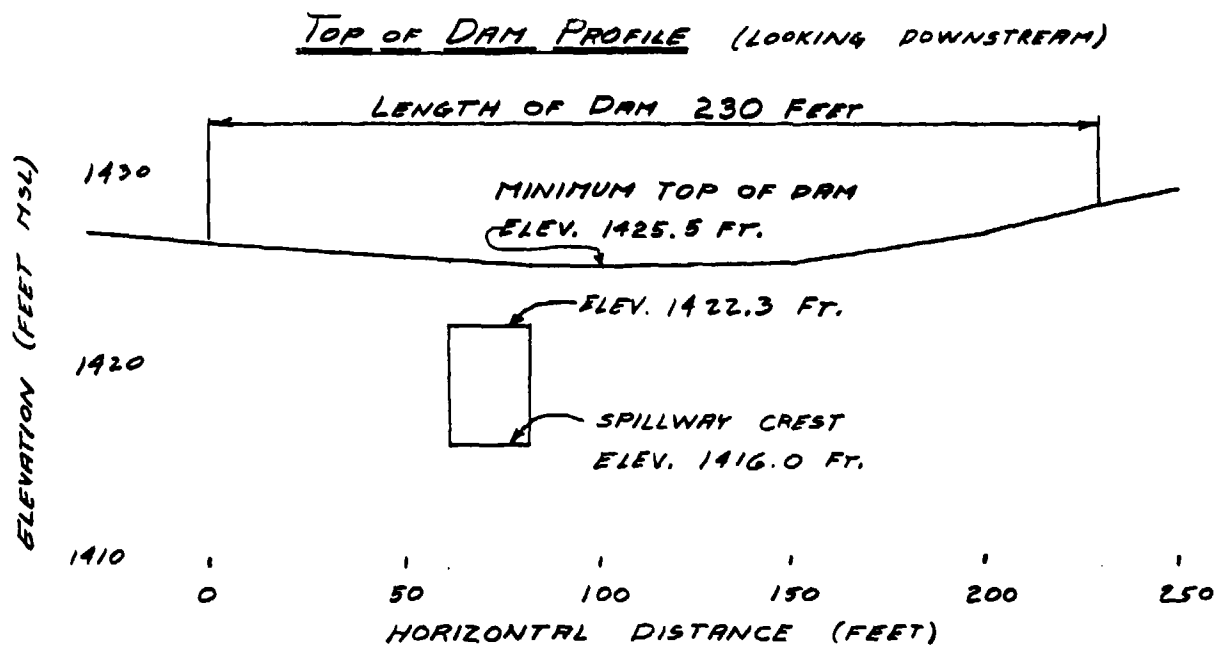
PLATE 2 WATERSHED MAP
MILLERS POND DAM

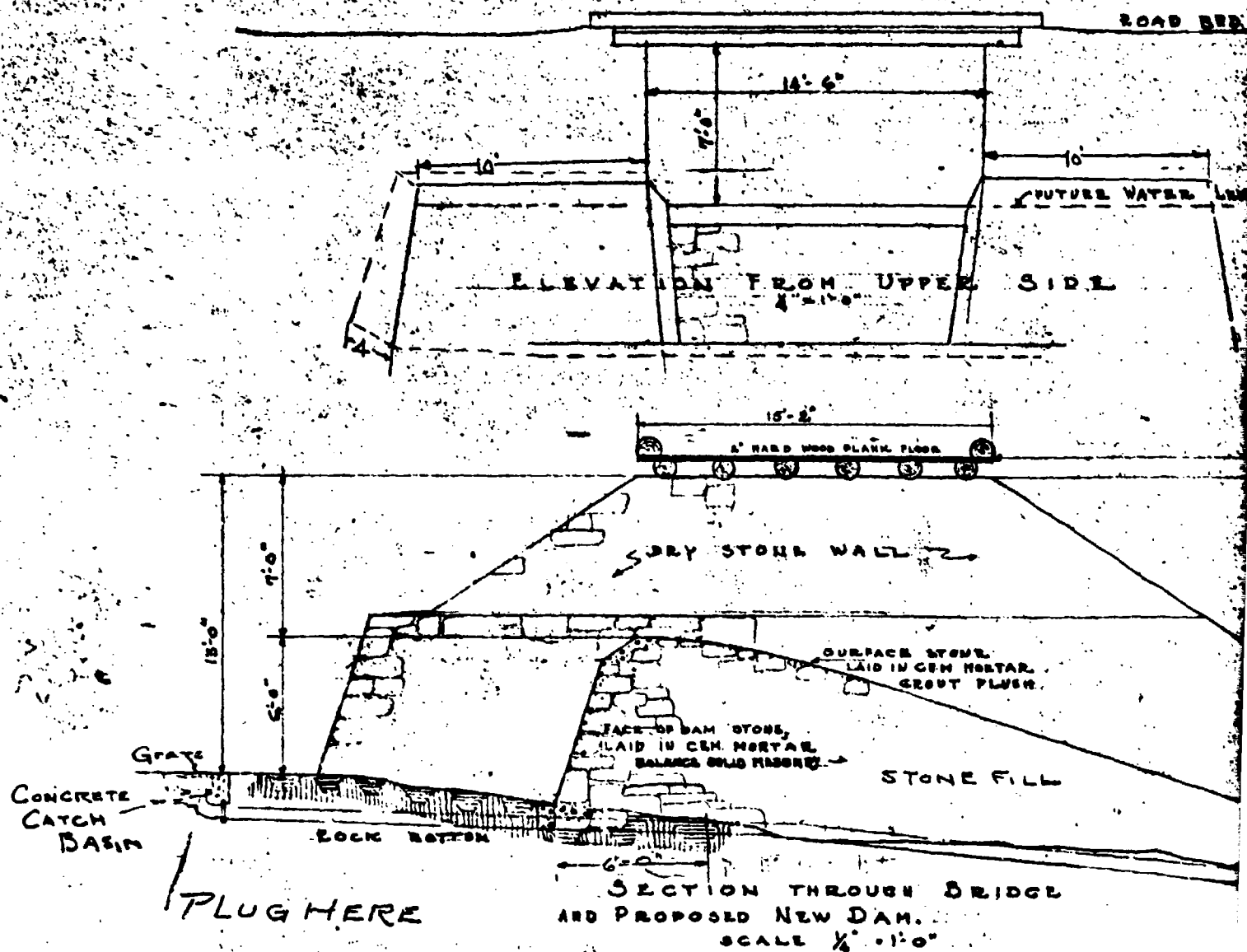


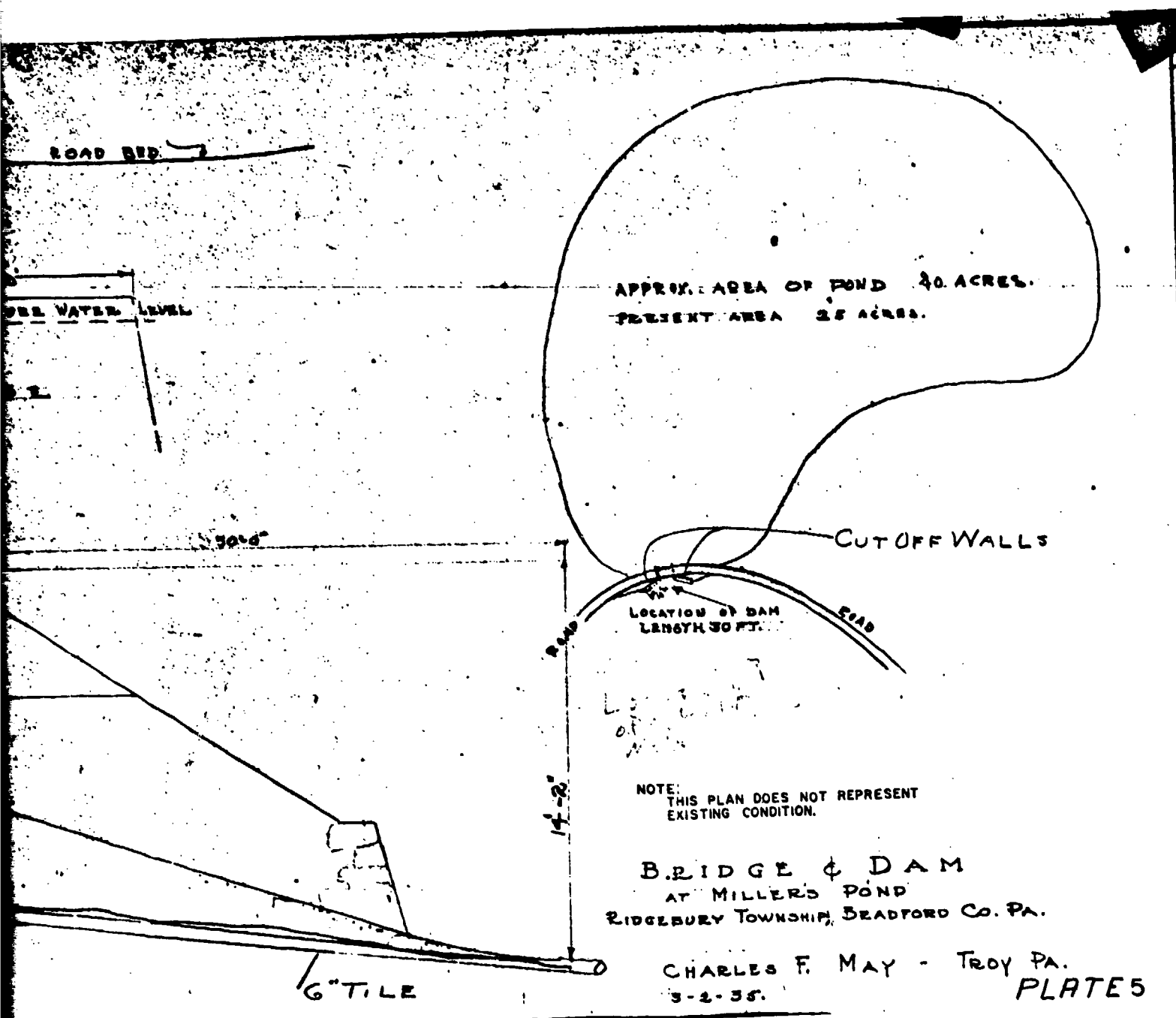
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Beaver, Pa. 15009







NOTE:
THIS PLAN DOES NOT REPRESENT
EXISTING CONDITION.

BRIDGE & DAM
AT MILLER'S POND
RIDGEBURY TOWNSHIP, BEDFORD CO. PA.

CHARLES F. MAY - TROY PA.
3-2-35.
PLATE 5

APPENDIX F
REGIONAL GEOLOGY

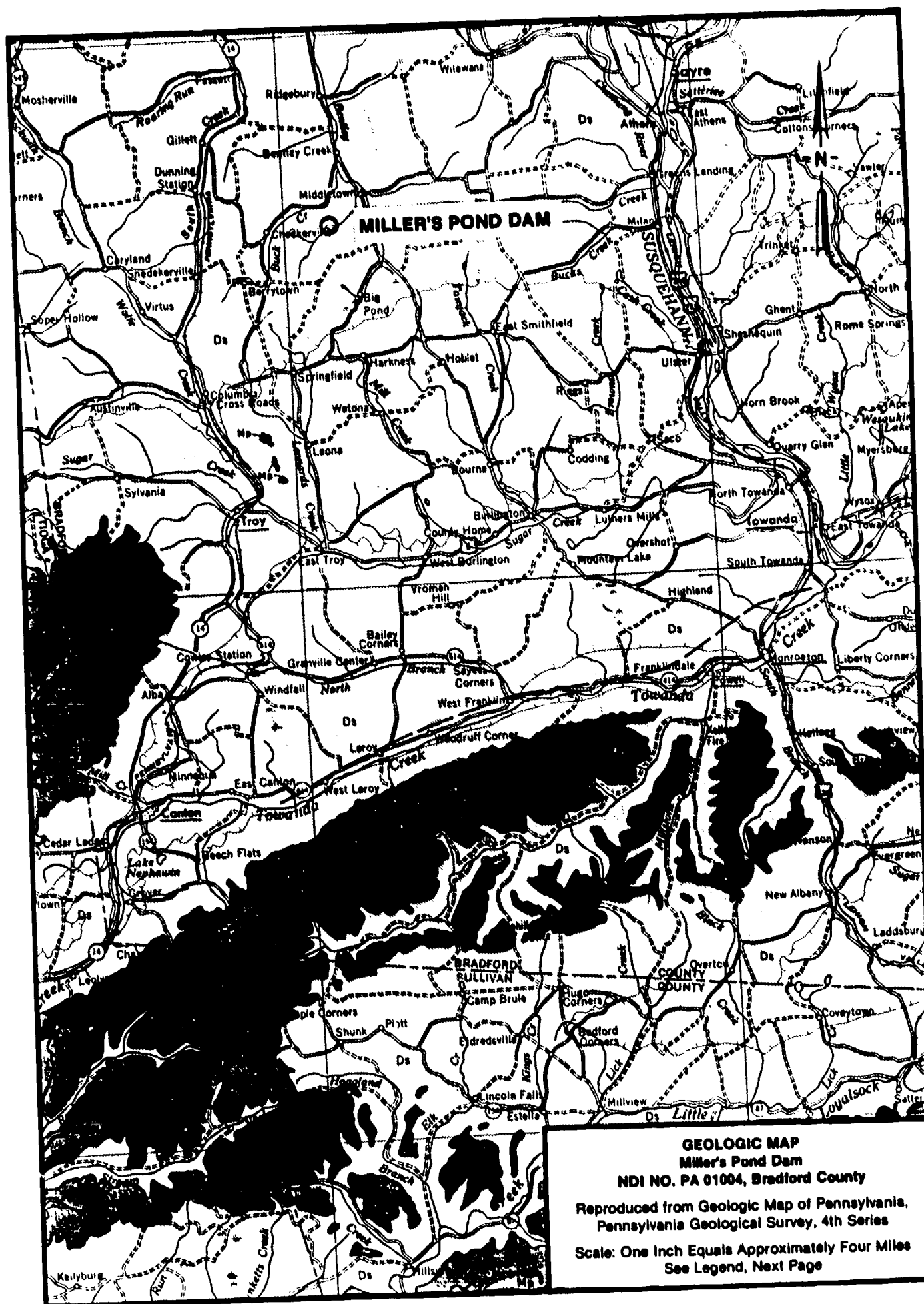
Miller's Pond Dam
NDI No. PA 01004, Bradford County

REGIONAL GEOLOGY

Miller's Pond Dam is located in the glaciated part of the Appalachian Plateau and Physiographic Province. The pond fills a broad stream valley with an average topographic relief of 300 feet. Miller's Pond impounds water from the upper reaches of Miller Run. The water discharging from the pond flows northeast to Bently Creek. Bently Creek, in turn, flows north into New York State.

The area has been glaciated at least three times and is covered by glacial ground moraine of the Nebraskan, Kansan, and Wisconsin glaciations. No test boring information was available for review. Soil Conservation Service maps indicate soils in the vicinity of the dam to be yellowish brown, stoney-to-very-stoney silt loams of varying thickness.

Geologic data taken from the Pennsylvania geologic map indicate the bedrock underlying the dam is composed of undifferentiated rocks of the Susquehanna Group. In other parts of Pennsylvania, the Susquehanna Group has been subdivided into the Marine beds, the Catskill Formation, and the Oswayo Formation. In the area of Miller's Pond Dam, it is most likely that the lithologic units exposed at the surface are the Marine beds. These beds are composed of gray-to-olive brown shales, graywackes, and sandstones that contain "Chemung" beds and "Portage" beds including Burket, Brallier, Hartzell, and Trimmers Rock with the Tully Limestone at the base.



GEOLOGY MAP LEGEND

DEVONIAN

UPPER

WESTERN PENNSYLVANIA



Oswayo Formation

Greenish gray to gray shales, siltstones and sandstones becoming increasingly shaly westward, considered equivalent to type Oswayo, Riceville Formation Dr in Erie and Crawford Counties; probably not distinguishable north of Carry.



Cattaraugus Formation

Red, gray and brown shale and sandstone with the proportion of red decreasing westward, includes Venango sands of dillers and Salamanca sandstone and conglomerate; some limestone in Crawford and Erie counties.



Conneaut Group

Alternating gray, brown, greenish and purplish shales and siltstones; includes "pink rock" of dillers and "Chemung" and "Girard" Formations of northwestern Pennsylvania.



Canadaway Formation

Alternating brown shales and sandstones; includes "Portage" Formation of northwestern Pennsylvania.

CENTRAL AND EASTERN PENNSYLVANIA



Oswayo Formation

Brownish and greenish gray, fine and medium grained sandstones with some shales and scattered calcareous lenses; includes red shales which become more numerous eastward. Relation to type Oswayo not proved.



Catskill Formation

Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone, tongue named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.



Marine beds

Gray to olive brown shales, graywackes, and sandstones, contains "Chemung" beds and "Portage" beds including Bucklet, Butler, Harrell, and Trimmers Rock, Tully Limestone at base.



Susquehanna Group

Barbed line in "Chemung-Catskill" contact of second Pennsylvania Survey County reports; barbs on "Chemung" side of line.

MIDDLE AND LOWER



Hamilton Group



Mahantango Formation

Brown to olive shale with interbedded sandstones which are dominant in places (Montebello); highly fossiliferous in upper part; contains "Centerfield coral bed" in eastern Pennsylvania.

Marcellus Formation

Black, fissile, carbonaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.



Onondaga Formation

Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places; includes Selinusque Limestone and Needmore Shale in central Pennsylvania and Butterfield Falls Limestone and Esopus Shale in easternmost Pennsylvania; in Lehigh Gap area includes Palmerton Sandstone and Roamanstown Chert.



Oriskany Formation

White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Reddyck) at the top; dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver).



Helderberg Formation

Dark gray, calcareous, thin bedded shale (Mandata) at the top, equivalent to Port Kean Shale and Hecraft Limestone in the east, dark gray, cherty, thin bedded, fossiliferous limestone (New Scotland) with some local sandstones in the middle, and, at the base, dark gray, medium to thick bedded, crystalline limestone (Cockmans) sandy and shaly in places with some chert nodules.